

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A method for removal of a freezable species from ~~the-a~~ gaseous natural gas feed stream, the method comprising ~~the steps of:~~
cooling the feed stream in a cooling vessel to produce pressurised LNG in a manner such that the freezable species solidify forming a slurry with the pressurised LNG, wherein the step of cooling is conducted so as to maintain a temperature gradient within the cooling vessel such that the temperature towards the center of the cooling vessel is less than the temperature at the wall of the cooling vessel; and,
removing the slurry from the cooling vessel whilst maintaining the freezable species as a solid.
2. (Cancelled).
3. (Original) A method for removal of a freezable species as defined in claim 1 further comprising the step of separating the solids of the freezable species from the slurry.
4. (Original) A method for removal of a freezable species as defined in claim 3 wherein the step of removing the slurry from the cooling vessel is conducted simultaneously with the step of separating the freezable species from the slurry.

5. (Previously Presented) A method for removal of a freezable species according to claim 1 further comprising the step of recycling to the cooling vessel LNG from which the freezable species has been separated.

6. (Previously Presented) A method for removal of a freezable species according to claim 1 further comprising the step of liquefying the separated solid of the freezable species.

7. (Original) A method for removal of a freezable species as defined in claim 6 wherein further comprising the step of recycling to the cooling vessel natural gas from which the freezable species has been separated during the step of liquefying.

8. (Previously Presented) A method for removal of a freezable species according to claim 1 further comprising the step of creating a vortex within the cooling vessel.

9. (Original) A method for removal of a freezable species as defined in claim 8 wherein the vortex is created by stirring the slurry.

10. (Previously Presented) A method for removal of a freezable species according to claim 8 wherein the vortex is created by one or both of (a) stirring the slurry; and, (b) introducing a fluid stream tangentially to the cooling vessel.

11. (Original) A method for removal of a freezable species as defined in claim 10 wherein the fluid stream introduced tangentially to the cooling vessel is a stream of sub-cooled LNG.

12. (Original) A method for removal of a freezable species as defined in claim 11 wherein the stream of sub-cooled LNG may be the sub-cooled LNG stream recycled after separation of the freezable species from the slurry.

13. (Previously Presented) A method for removal of a freezable species according to claim 1 wherein the step of cooling comprises the step of isotropically expanding the feed stream.

14. (Previously Presented) A method for removal of a freezable species according to claim 5 wherein the step of cooling comprises one or both of (a) isotropically expanding the feed stream; and, (b) introducing a stream of sub-cooled LNG.

15. (Original) A method for removal of a freezable species as defined in claim 14 wherein the stream of sub-cooled LNG is the stream of recycled LNG separated from the slurry during the step of separating the solids of the freezable species.

16. (Currently Amended) A method for the continuous removal of a freezable species from a gaseous natural gas feed stream comprising the steps of:
cooling the feed stream in a cooling vessel to produce pressurised LNG in a manner such that the freezable species solidify forming a slurry with the pressurised LNG, wherein the step of cooling is conducted so as to maintain a temperature gradient within the cooling vessel such that the temperature towards the center of the cooling vessel is less than the temperature at the wall of the cooling vessel; and,

separating the solids of the freezable species from the slurry, wherein the step of cooling and the step of separating are conducted at the same working pressure.

17. (Original) A method for the continuous removal of a freezable species as defined in claim 16 wherein the steps of cooling and separating are conducted at the same pressure in use.

18. (Previously Presented) A method for the continuous removal of a freezable species as defined in claim 16 further comprising the step of heating the separated solids of the freezable species to form a liquid of the freezable species.

19. (Original) A method for the continuous removal of a freezable species as defined in claim 18 wherein the steps of cooling, separating and heating are conducted at the same pressure in use.

20. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 17 wherein the pressure is maintained at all times below the triple-point pressure of the freezable species.

21. (Cancelled).

22. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 16 further comprising the step of removing the slurry from the cooling vessel.

23. (Original) A method for continuous removal of a freezable species as defined in claim 22 wherein the step of removing the slurry from the cooling vessel is conducted simultaneously with the step of separating the freezable species from the slurry.

24. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 16 further comprising the step of recycling to the cooling vessel LNG from which the freezable species has been separated.

25. (Previously Presented) A method for continuous removal of freezable species as defined in claim 16 further comprising the step of liquefying the separated solid of the freezable species.

26. (Original) A method for continuous removal of a freezable species as defined in claim 25 wherein further comprising the step of recycling to the cooling vessel natural gas from which the freezable species has been separated during the step of liquefying.

27. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 16 further comprising the step of creating a vortex within the cooling vessel.

28. (Original) A method for continuous removal of a freezable species as defined in claim 27 wherein the vortex is created by stirring the slurry.

29. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 27 wherein the vortex is created by one or both of (a) stirring the slurry; and, (b) introducing a fluid stream tangentially to the cooling vessel.

30. (Original) A method for continuous removal of a freezable species as defined in claim 29 wherein the fluid stream introduced tangentially to the cooling vessel is a stream of sub-cooled LNG.

31. (Original) A method for continuous removal of a freezable species as defined in claim 30 wherein the stream of sub-cooled LNG may be the sub-cooled LNG stream recycled after separation of the freezable species from the slurry.

32. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 16 wherein the step of cooling comprises the step of isotropically expanding the feed stream.

33. (Previously Presented) A method for continuous removal of a freezable species as defined in claim 16 wherein the step of cooling comprises one or both of (a) isotropically expanding the feed stream; and, (b) introducing a stream of sub-cooled LNG.

34. (Original) A method for continuous removal of a freezable species as defined in claim 33 wherein the stream of sub-cooled LNG is the stream of recycled LNG separated from the slurry during the step of separating the solids of the freezable species.

35. (Previously Presented) An apparatus for removing a freezable species from a natural gas feed stream, the apparatus comprising:

a cooling vessel having a solidification zone therewithin wherein a part of the cooling vessel that surrounds the solidification zone is constructed from a material having a low thermal conductivity;

an inlet for introducing the feed stream to the cooling vessel; and,

an outlet for removing a slurry of solidified freezable species and pressurised LNG from the cooling vessel.

36. (Original) An apparatus for removing a freezable species as defined in claim 35 further comprising a solid/liquid separator for separating the solidified freezable species from the slurry.

37. (Original) An apparatus for removing a freezable species as defined in claim 36 wherein the separator is located at and/or defines the outlet.

38. (Previously Presented) An apparatus for removing a freezable species as defined in claim 36 wherein the separator may be one of a plurality of separators arranged in series or in parallel.

39. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 further comprising an expansion valve located at and/or defining the inlet for introducing the feed stream to the cooling vessel.

40. (Original) An apparatus for removing a freezable species as defined in claim 39 wherein the expansion valve is a Joule-Thompson valve.

41. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 further comprising a stirrer for creating a vortex within the cooling vessel in use.

42. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the inlet is configured to introduce the feed stream tangentially to an internal wall of said cooling vessel.

43. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction of an internal wall of the cooling vessel is polished.

44. (Previously Presented) An apparatus for removing a freezable species as defined in claim 43 wherein the internal wall is highly polished.

45. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction of an internal wall of the cooling vessel is anisotropic.

46. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction on an internal wall of the cooling vessel is a metal oxide.

47. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction of an internal wall of the cooling vessel is a ceramic.

48. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction of an internal wall of the cooling vessel is a single crystal.

49. (Previously Presented) An apparatus for removing a freezable species as defined in claim 35 wherein the material of construction of an internal wall of the cooling vessel is sapphire.

50. (Previously Presented) An apparatus for continuously removing a freezable species from a natural gas feed stream, the apparatus comprising:

 a cooling vessel having a solidification zone therewithin wherein a part of the cooling vessel that surrounds the solidification zone is constructed from a material having a low thermal conductivity;

 an inlet for introducing the feed stream to the cooling vessel;

 an outlet for removing a slurry of solidified freezable species and pressurised LNG from the cooling vessel; and

 a solids collection vessel in fluid communication with the cooling vessel.

51. (Original) An apparatus for continuously removing a freezable species as defined in claim 50 further comprising a transfer means for transferring the slurry from the cooling vessel to the solids collection vessel.

52. (Original) An apparatus for continuously removing a freezable species as defined in claim 51 wherein the transfer means is inclined at an angle.

53. (Original) An apparatus for continuously removing a freezable species as defined in claim 52 wherein the angle is not less than 60° to the horizontal reference plane.

54. (Previously Presented) An apparatus for continuously removing a freezable species as defined in claim 52 wherein the transfer means is provided with an external drive.